COMPUTERIZED SYSTEM AND METHOD FOR OPTIMIZING AFTER-TAX PROCEEDS INVOLVING OPTIONS

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CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of co-pending U.S. patent application no. 09/253,453, filed February 19, 1999.

BACKGROUND OF THE INVENTION

This invention concerns a computer method and system for processing financial securities and instruments. More particularly, this invention accurately determines the after-tax proceeds an investor could expect to have at the end of a holding period for each of a set of investment strategies involving options, and determines an optimal strategy for maximizing such after-tax proceeds.

Taxation is a significant concern to investors and others who are evaluating capital investment transactions such as buying or selling a stock. A transaction that appears to yield a certain before-tax profit may prove less profitable than anticipated after taxes are assessed. Similarly, a transaction that appears to produce a financial loss may actually prove to be less of a loss when tax-losses are offset against capital gains and the liquidated capital is re-invested.

Frequently an investment is sold to re-invest the proceeds in another potentially more profitable capital investment vehicle, and so not merely to liquidate profits. However, the consequences of selling a currently held investment instrument to buy an alternate instrument can only be accurately evaluated by knowing the tax consequences of the transaction in advance. This is particularly true under most capital gain taxation regimes because different, usually lower, tax rates are applied when the investment is held for longer periods. Under some capital gains tax laws the tax rate may be reduced after a specified holding period, such as one year.

Investors and others who manage financial transactions need to be able to assess the after-tax consequences of potential transactions. More importantly, they need to be aware, a priori, of the after-tax consequences of a potential transaction in order to make informed investment decisions that optimize after-tax profits. In order to produce optimal after-tax results, the consequences of each transaction must be made in light of an investor's past and current transactions, the available investment alternatives, their tax bracket, and other factors.

A need exists for a system or method which finds optimal solutions to after-tax investment yields. Previous investment analysis mechanisms have not adequately taken into account the taxation profile and investment expectations of each individual investor, nor do they operate over an entire portfolio. In addition there is a need for a system or method which allows users to make a priori and "what if" calculations to guide their investment decisions.

One known method that attempts to solve the capital gains tax problem is called tax efficiency. Tax efficiency strategies approach the capital gains taxation problem by adopting a low turn-over strategy, where investments are held for periods that are at least long enough to lower the capital gains tax rates. Typically, under the tax efficiency investment discipline, an investor selects low dividend

instruments and holds these instruments long enough to avoid higher capital gains rates. This approach, as titled, may be efficient in that it attempts to reduce the tax consequences of investing. However, in doing so, it eliminates the potential of achieving the highest level of after-tax proceeds, by not assessing if and when a stock which should be sold prior to the long-term window, in order to optimize the highest returns by calculating the economic break-even point of advantage. Accordingly, a need exists for a system or method which takes such re-investment considerations into account.

In addition, in the prior art, when options and other derivative rights are involved in investment planning, many financial advisers and options holders refrain from exercising options in the mistaken belief that retaining options is more profitable. In fact, retaining options may, in some investment strategies, be less profitable, including in light of after-tax determinations. More often, such failures to exercise options occurs since financial advisers and options holders do not perform sufficient, if any, calculations to determine the after-tax effects and proceeds involving exercised and non-exercised options. In the prior art, such advisers and/or options holders would not perform such calculations, since the calculations are viewed as being too complicated with too many and unmanageable ramifications stemming from the exercise or non-exercise of options. In addition, in the prior art, the after-tax effects and proceeds involving options has not been performed on a micro-basis over a plurality of strategies, for example, since such analyses are considered too complicated.

A need exists for a system and method for determining optimized investment strategies involving options and/or other derivative rights.

SUMMARY OF THE INVENTION

A computerized system and method optimizes after-tax proceeds using an after-tax calculation engine employing "DYNAMIC TAX LOGIC" commercially available from Dynamic Capital Management, The computerized system and method accurately determines the after-tax amount of money an individual could expect to have at the end of a holding period for each of a set of investment strategies associated with a particular lot of stock held, including taxable lots and derivative rights, such as options and derivatives, as well as bonds and other financial instruments.

The disclosed computerized system provides several key advantages for investors and others who are interested in optimizing after-tax return on capital investments. These include:

(1) A priori knowledge to provide the ability for investors to see the tax consequences of their investment decisions in advance;

(2) "What if" calculations allowing investors to immediately see the projected results of their transaction decisions without actually executing the trades or doing their tax returns; and

(3) Self-managed expectations in which evaluation of the expected return of an investment, either one that is currently held or an alternate that is being considered, is a subjective process that involves some risk. Therefore, it is important for users to evaluate different investment strategies under different sets of performance expectations. In the disclosed computerized system, expectations (such as, for example, price targets) are specified by the user. Users can either use expectations supplied by a fund manager or use expectations which they have determined themselves.

The computerized system and method helps to produce optimal investment strategies that not only maximize after-tax profits for the individual investor but

which also serve the socially useful purpose of increasing capital mobility and allocating investment capital in those areas where it is most productive, for example, where it generates the most wealth. Thus, the computerized system and method mitigates real and perceived inhibitions on capital mobility that result from the perception of economic distortions that may be caused by the lack of understanding, a priori, of the effects on wealth generation by our tax laws.

The computerized system and method allows users to answer the following multi-part investment question before committing to a transaction:

At what price does it make sense to:

(1) sell an investment instrument;

(2) pay the associated capital gains tax and other fees; and

(3) re-invest in another, potentially better, investment instrument?

A key variable to be determined is the holding period or investment horizon, which is arbitrarily determined by the investor. In an illustrative embodiment this period may be specified to be a 36 month, a 48 month or a 60 month extended holding period, but any arbitrary period length may be programmed and used.

The application of the computerized system and method involves, for example, building the following set of unique assumptions, a specific fact set, and a set of expectations that are applicable to each subject lot. The fact set may include:

(1) the current market price that the subject lot could be currently sold for;

(2) the lot owner's long-term and short-term marginal rates that would be applicable to the subject lot;

(3) the number of shares included in the lot;

(4) the total cost of the lot;

(5) the number of months remaining until a held position would enter the long-term tax window, when rounded up to the longest month;

(6) an annual percentage advisor fee, if applicable, and/or an annual brokerage wrap fee, if applicable; and

(7) a cents per share brokerage expense, if applicable.

The following expectation set may be used, and include:

(1) an assumption about the subject stock price at the beginning of the long-term window, and at the termination of an existing 36, 48, or 60 month investment horizon, arrived at by either assuming an earnings base, a five year earnings growth rate and price earnings (PE) assumption for the subject stock or a static target price for the subject stock for the termination of either a 36, 48, or 60 month investment horizon;

(2) the dividend rate of the subject stock;

(3) the dividend growth rate of the held stock;

(4) the total before-tax-return potential from either a specific stock or an otherwise active re-investment discipline option, assuming the various alternate re-investment options all calculate dividend rates equal to a current rate of the S&P500;

(5) the turnover assumption anticipated with any re-investment strategy;

(6) a five-year growth rate assumption for the Standard & Poor's 500 (S&P500), where a passive strategy comparison is desired;

(7) a five-year price-earnings forecast for the S&P500; and

(8) an assumption as to how vulnerable to an immediate loss a specific lot might be subject to.

The computerized system and method then compares the after-tax proceeds of several investment strategies to identify which is optimal from an after-tax perspective. The computerized system and method may evaluate the following example strategies:

(1) purchasing a lot of a security at the currently inputted price and holding for the selected holding period;

(2) holding an existing lot position until the termination of an investment horizon;

(3) selling the lot at currently inputted prices and re-investing in another lot or otherwise in an active investment discipline for a specified investment horizon;

(4) selling the lot at currently inputted prices and re-investing in a secondary or S&P500-based passive discipline for a specified investment horizon;

(5) selling the lot at the beginning of the long-term window and re-investing in a primary or active investment discipline, for the number of months remaining after an anticipated sell, for a specified investment horizon; or

(6) selling the lot at the beginning of the long-term window and re-investing in an S&P500-based passive discipline for the number of months remaining after an anticipated sell, for a specified investment horizon.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates the disclosed computerized system for optimizing after-tax proceeds.

FIG. 2 illustrates a flow chart of the operation of the computerized method and system.

FIGS. 3A-3G illustrates spreadsheet embodiments of client input customization windows where users or others can enter facts about the investment lot that is being evaluated.

FIGS. 4A-4B illustrates a spreadsheet embodiment of the price targeting module which computes target prices and sales and taxable gains for lot re-investment.

FIGS. 5A-5D illustrates a spreadsheet embodiment of the tax loss harvest analyzer which offsets tax credits from investments that were sold at a loss against other capital gains in an optimizing strategy. A loss is harvested when raising the cost-basis of a gain by the amount of a loss which reduces the taxes enough to generate higher after-tax proceeds re-invested for higher returns.

FIG. 6 illustrates a spreadsheet embodiment of the comparative pro-forma sensitivity analyzer in which cell formulas for the spreadsheet embodiment of the pro-forma sensitivity analyzer are presented in Appendix A.

FIG. 7 illustrates a spreadsheet embodiment of the optimal strategy window which displays results of the pro-forma processing, such as the optimal strategies for producing after-tax proceeds.

FIG. 8 illustrates a chart depicting results of the computerized system and method for optimizing after-tax proceeds compared with alternate investment strategies that are known in the art.

FIG. 9 illustrates a block diagram of the disclosed computerized system implementing the alternative embodiment of the disclosed system.

FIG. 10 illustrates a flow chart of the operation of the alternative embodiment of the computerized method and system shown in FIG. 9.

FIG. 11 illustrates a chart depicting results of the computerized system and method for optimizing after-tax proceeds involving options using a simple options investment strategy.

FIG. 12 illustrates a chart depicting results of the computerized system and method for optimizing after-tax proceeds involving options compared with multiple alternate investment strategies that are known in the art.

FIGS. 13-43 illustrate example spreadsheet listings of an alternative embodiment of the disclosed computerized system for optimizing after-tax proceeds involving taxable lots and derivative rights for options.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The computerized system 100 and method for implementing the invention includes a user interface 102 indicated in FIG. 1, a processor 104, and memory 106. The user interface 102 is used for entering the financial data to be processed, for displaying results of the processing, and for other purposes. As shown in FIG. 1, the user interface 102 may include input/output (I/O) devices 108, a spreadsheet window 110, a graphic user interface (GUI) 112, and/or a browser 114. The processor 104 includes hardware and/or software for performing the analysis, in which the processor 104 may include one or more computers. For example, a processor 104 may include a "PENTIUM" available from "INTEL", connected to a personal computer and/or a server over an intranet and/or the Internet. The memory 106 includes a variety of information about investment alternatives, performance expectations for these investment alternatives, client data, and other information.

The computerized system 100 and method may be embodied as a standalone program such as a spreadsheet 116 or dedicated application 118. Examples of spreadsheets include commercially available programs such as "LOTUS 123", "EXCEL" or others. A dedicated application program 118 may be implemented in a number of computer programming languages such as "JAVA", C, C++, APL, COBOL, BASIC or others. Such a dedicated application 118 might be implemented on various computing platforms and operating systems, including "MICROSOFT WINDOWS", the "APPLE MACINTOSH" or other systems. The spreadsheet 116 and/or the dedicated application 118 may also be used with computer-readable medium, such as a diskette, a portable hard drive, a magnetic tape or disk, a CD-ROM, and the like for use in a computer to optimize after-tax proceeds, with the computer read-able medium storing spreadsheet 116 and/or the dedicated application 118 as a predetermined software program implementing a method comprising, for

example, the steps of: receiving tax and investment data, user-customized investment expectations, and financial adviser-based investment expectations; performing tax loss harvesting analysis on the user-customized investment expectations and the financial adviser-based investment expectations over a dynamic taxation time range using a predetermined software program; performing comparative pro-forma tax sensitivity analysis of the tax and investment data and the analyzed investment expectations using the predetermined software program; and determining and outputting an optimal after-tax investment strategy path from a plurality of investment strategy paths over the dynamic taxation time range using the predetermined software program to optimize the after-tax proceeds from the plurality of investment strategies.

The invention may also be embodied as a networked or distributed system such as an Internet-based application and/or a World Wide Web (WWW)-based application on the Internet and connected components. Other embodiments are also possible such as intranet and extranet applications accessible by the browser 114. The spreadsheet and World Wide Web embodiments are described in more detail below.

In the spreadsheet embodiment, a spreadsheet includes a set of input and output windows, stored data cells, and formula cells. The spreadsheet applies the computerized system 100 and method for optimizing after-tax proceeds by applying the formula cells to the user inputs and stored data cells to produce a set of cells including projected results of the strategies that optimize after-tax proceeds.

The spreadsheet embodiment includes six primary modules which are shown in FIG. 2. Investors or other users may operate the program through a set of input windows that correspond to system modules 204, 206 shown in FIG. 2. Facts about the user's investment situation and information about the lot of investment instruments that the user is analyzing are input in block 204. Expectations that the

user has or specifies are input in block 206, which may include but are not limited to holds, price targeting, dividends, dividend growth rates, and re-investment return assumptions for processing by the tax loss harvesting analyzer 210. Note that it is possible for the user to enter their own expectations or to use a set of expectations provided by others, such as a financial investment advisor. The computerized method and system 100 computes optimal after-tax proceeds using formulas in cells forming the modules shown in blocks 202, 208, and 210. The price targeting module 202 determines reasonable target prices over various time horizons.

The tax loss harvesting analyzer 210 applies tax credits that have accrued from transactions which produced a loss and applies these credits to offset potential capital gains from existing or future transactions which are profitable. The pro-forma sensitivity analyzer 208 assesses alternative investment strategies in light of information provided by the modules described above, and other financial analysis modules. The results of the analysis are presented and/or output to the user in the optimal strategy path window 212. Thus the user may make iterative adjustments in the user input window and observe results of the changes in the optimal strategy path recommendation window.

The user input window 204 and shown in more detail in FIGS. 3A-3G includes variables that the user may adjust. FIG. 3A includes cells AK549-AP584 for inputting subjective assumptions of a financial adviser as SYSTEM DEFAULTS, and of a client/customer as CUSTOM ASSUMPTIONS. FIGS. 3B-3G include cells CM1-CR161 for inputting client/customer data such as short-term and long-term tax rates, as well as for inputting data from a financial advisor, in this case "DYNAMIC CAPITAL MANAGEMENT" (DCM), to store such tax rates and/or data. Such input data may be used by other portions of the spreadsheet, such as the cells shown in Appendix A, as well as by other alternative embodiments such as a website implementing the disclosed computerized system 100 and method.

For example, referring to FIG. 3A, on row 561 the user may specify a five year target price for the value of the financial instrument which is being analyzed, for example in this case a stock. The fact sets and set of expectations may be entered either by a financial advisor or by the user. In the example shown in FIG. 3A, the financial advisor may input his/her default values in column AN, while the customized assumptions of a client, which may be different from such values of the financial advisor, may be input in column AP. These variables input in columns AN and AP and specified in rows 556-584 in FIG. 3A include the short-term and long-term tax rates and other related parameters. For example, in cells AN561 and AP561, the five year target price specified by both the financial adviser and the client is set to 16.0 %. In this manner, the financial advisor working with the client or working individually can performed different permutations of investment assumptions to implement conservative or aggressive investment strategies to optimize the after-tax proceeds.

FIGS. 4A-4B depict the capital gains determined using sale prices resulting from the price targeting module 202, with such capital gains realized based on the assumptions of both financial advisor, such as DCM, and the customer, and with such capital gains realized for both the short-term and long-term windows over the succeeding 12 month period. For example, based on the input data, the price targeting module 202 may indicate that the long-term window market value is $ 6,594 for active long-term re-investment, based on both the assumptions of the financial advisor (DCM), as specified in cell C694, and the customized assumptions of the client, as specified in cell F694.

The tax loss harvester 210, shown in more detail in FIGS. 5A-5D, applies tax credits that have accrued from transactions which produced a loss and applies these credits to offset potential capital gains from existing or future transactions which are profitable. Referring to cells AK490-AO538 in FIGS. 5A-5D and the corresponding

cells with associated formulae in Appendix A, the tax loss harvester 210 calculates tax effects for windows such as 36 months, 48 months, and 60 months. For example, the net long term gains based on the input data are specified in cell AM498, which is determined using a conditional expression IF(AL508=AL512,$AM523,0). Upon determining that the equality condition exists, the value of cell AM498 is determined to be the value of cell AM523. Otherwise, upon inequality, the value of cell AM498 is set to 0. In the present example, inequality exists, so the net long term gains are determined to be 0. Similarly, using the formulae in Appendix A, the tax loss harvester 210 with the associated spreadsheet window and parameters determines the various cells shown in FIGS. 5A-5D.

Using the tax loss harvester 210, optimization is further enhanced by utilizing losses against gains on stocks with the least return potential, by raising the cost basis of the gain in a dollar amount not exceeding a respective loss. Such raising of the cost basis thereby reduces the profits, and yields enough higher after-tax proceeds of a sale option, that of exceeding a hold or a wait until the long-term window emerges, if applicable, and thereby achieves optimum after-tax dollars through more aggressive re-investment.

Results may be viewed in the output window, or optimal strategy path module 212 and shown in detail in FIG. 6, including cells AK606-AQ647, with associated formulae shown in Appendix A. This window presents different investment strategies such as holding the investment, selling the investment immediately with either active or passive re-investment, or selling the investment long-term, again with active or passive re-investment. By presenting such investment information in column form, the system 100 and method permit a user to compare and choose the optimal results of several investment options.

For the optimal strategy path module 212, many of the values in the cells AK606-AQ647 are obtained from the cells CP60-CP146 shown, for example, in FIGS. 3B-3G, which are in turn determined by the comparative pro-forma sensitivity analyzer module 208 using predetermined formulae in the cells AL676-AR725 in Appendix A associated with the comparative pro-forma sensitivity analyzer module 208. For example, the five year value for a sell-now with passive re-investment strategy, indicated in cell AQ619 in FIG. 6, has the value of cell CP71, specified in Appendix A, which in turn has the value of cell AP725 shown in Appendix A, involving calculations of the comparative pro-forma sensitivity analyzer module 208 shown in FIG. 7. Accordingly, cell AP725 determines the value of:

AP717+AP718+AP720-AP721-AP722-AP723-AP724

as shown in the formula in cell AP725 in Appendix A, which reflects the addition of the after-tax values of a lot after year four with the year five capital appreciation and the year five dividend income, less the year five capital gains tax and the ordinary tax, any year five fixed fee, and year five commission expenses. With such calculations performed by the predetermined formulae in cells AL676-AR725, the optimal strategy path module 212 determines and displays the various recommendations based on the calculations of the comparative pro-forma sensitivity analyzer module 208.

The comparative pro-forma sensitivity analyzer module 208 in FIG. 7 compares different investment strategies based on the results from other modules of the computerized system. Formulas in the spreadsheet cells, such as the cells AK671-AR762 shown in Appendix A, apply the Dynamic Tax Logic (DTL) process implemented in FIGS. 3A-7 to various sets of investment alternatives to find strategies that produce optimal after-tax proceeds. For example, in Appendix A, the cell formula at AL683 computes the value of the investment lot held for five years by multiplying the number of shares specified in predetermined locations in

memory, such as in cells which receive such data from a user or a database. For example, in one embodiment, the value in cell AL683 is determined by multiplying the values in cell AN573 corresponding to the number of shares by the last or current stock price specified in B2.

Additional cells throughout the spreadsheet may store additional data and formula for use by the modules 202-212, and have either input data or predetermined formulae. For example, cell F18 may include a dividend growth rate for use in determining year two dividend income for new purchase and for held positions in cells AL696 and AM696, respectively, as per Appendix A. Similarly, CP55 stores a stock supportable dividend yield for use by the formulae in cells AL678-AM678 and the corresponding values specified in FIG. 7.

In addition to the modules described above, other cells in the spreadsheet contain further information on the universe of investment alternatives currently tracked in the spreadsheet. This includes current and historical information on the universe of investment alternatives, information on past market performance, and other information. It is understood that the spreadsheet and/or memory locations may store and access information and data for processing by the modules 202-212, including text, data, and formulae which are known in the art for implementing the disclosed invention. A variety of analytic measures that further describe the actual past performance and expected future performance of these investment instruments are computed by a predetermined set of formulas in cells and stored for use by other modules in the spreadsheet.

FIG. 8 shows the results of the computerized system 100 and method for optimizing after-tax proceeds compared with alternate investment strategies that are known in the art. This chart compares six investment disciplines that measure the value of the investment if: (1) held, with the proceeds computed at market value, without taxation or other costs; shown as line 902; (2) sold long-term with the

proceeds taxed and re-invested in an active investment discipline, shown as line 904; (3) held, with the proceeds computed at their true after-tax value, shown as line 906; (4) sold long-term with the proceeds taxed and re-invested in a term passive investment discipline, shown as line 908; (5) sold immediately, with the proceeds re-invested in an active investment discipline, shown as line 910; and (6) sold immediately, with the proceeds re-invested in a passive investment discipline, shown as line 912. There are several key features to note about the performance of the disclosed system 100 and method of the invention. First, the market value 902 is consistently greater than the after-tax proceeds of selling the investment since there is always a tax on the proceeds. Second, after another 6 months the proceeds shown in 904-908 jump since the capital gains tax rate is effectively lowered. In the examples shown in FIG. 8, it is assumed that a lot had been purchased six months previously.

Another embodiment of the invention is as a distributed processing system on a network, such as a World Wide Web (WWW) site on the Internet. Referring to FIG. 1, this embodiment includes a user interface 102 or front-end means that is available via the Internet by a client using a browser 114, or other access methods. The user interface 102 in this embodiment allows a client to enter various data through a set of forms, which gather substantially identical information as the input windows in the spreadsheet embodiment. The front end includes a set of web-page forms which may be written in the Hyper Text Markup Language (HTML). These pages provide a description of the program inputs and gather data from users through the set of input forms. These data are then transmitted through middleware such as a Common Gateway Interface (CGI) script to the DTL processor engine or computation server 120 as shown in FIG. 1. The processor engine then evaluates a set of alternate investment strategies using the DTL process. The universe of investments 122 in this embodiment can be dynamically updated or accessed

directly from the system 100. This is accomplished through processing methods and networked communications protocols that are known in the art. A set of results and recommendations are computed and transmitted back to the user through the CGI gateway where they are formatted and displayed as a customized webpage.

The DTL engine may also communicate with other databases 126 to maintain up-to-date information on all investment prices and related information. The DTL engine may also communicate with electronic brokerage systems to execute trades if desired by the user. The user data may be segregated from other data and may be saved between sessions. Thus the user data is both private and persistent. This allows each user to input fact sets regarding each lot of investment instruments they hold along with whatever investment expectations they may have available and then explore a variety of transactions based on these data.

The disclosed computerized system 100 and method optimizes after-tax proceeds using an after-tax calculation engine employing "DYNAMIC TAX LOGIC", "DYNAMIC TAX OPTIMIZATION", and/or "DYNAMIC TAX OPTIMIZER, products and services commercially available from "DYNAMIC CAPITAL MANAGEMENT". The computerized system 100 and method accurately determines the after-tax amount of money an individual could expect to have at the end of a holding period for each of a set of investment strategies associated with a particular lot of stock held.

The disclosed computerized system 100 provides several key advantages for investors and others who are interested in optimizing after-tax return on capital investments. These include:

(1) A priori knowledge to provide the ability for investors to see the tax consequences of their investment decisions in advance;

(2) "What if" calculations allowing investors to immediately see the projected results of their transaction decisions without actually executing the trades or doing their tax returns; and

(3) Self-managed expectations in which evaluation of the expected price targets or returns of an investment, either one that is currently held or an alternate that is being considered, is a subjective process that involves some risk. Therefore, it is important for users to evaluate different investment strategies under different sets of performance expectations. In the disclosed computerized system 100, expectations (such as, for example, price targets and dividend rates) are specified by the user. Users can either use expectations supplied by a fund manager or use expectations which they have determined themselves.

The computerized system 100 and method helps to produce optimal investment strategies that not only maximize profits for the individual investor but which also serves the socially useful purpose of increasing capital mobility and allocating investment capital in those areas where it is most productive, for example, where it generates the most wealth. Thus, the computerized system 100 and method mitigates real and perceived inhibitions on capital mobility that result from economic perceptions of distortions that may be caused by the lack of understanding, a priori, of the effects on wealth generation by our tax laws.

The computerized system 100 shown in FIG. 1 operating according to the method shown in FIG. 2 allows users to answer the following multi-part investment question before committing to a transaction:

At what price does it make sense to:

(1) sell an investment instrument;

(2) pay the associated capital gains tax and other fees; and

(3) re-invest in another, potentially better, investment instrument?

A key variable to be determined is the holding period or investment horizon, which is arbitrarily determined by the investor. In an illustrative embodiment FIG. 6 this period may be specified to be a 36 month, a 48 month or a 60 month extended holding period, but any arbitrary period length may be programmed and used.

The application of the computerized system 100 and method involves, for example, building a set of unique assumptions, including a specific fact set such as example fact sets shown in FIGS. 3A-3G, as well as a set of expectations that are applicable to each subject lot. The fact set may include:

(1) the current market price that the subject lot could be currently sold for;

(2) the lot owner's long-term and short-term marginal rates that would be applicable to the subject lot;

(3) the number of shares included in the lot;

(4) the total cost of the lot;

(5) the number of months remaining until a held position would enter the long-term tax window, when rounded up to the longest month;

(6) an annual percentage advisor fee, if applicable, and/or an annual brokerage wrap fee, if applicable; and

(7) a cents per share brokerage expense, if applicable.

The following expectation set may be used, and include:

(1) an assumption about the subject stock price at the beginning of the long-term window, and at the termination of an existing 36, 48, or 60 month investment horizon, arrived at by either assuming an earnings base, a five year earnings growth rate and PE assumption for the subject stock or a static target price for the subject stock, which may be arrived at with a static price target for the termination of either a 36, 48, or 60 month investment horizon;

(2) the dividend rate of the subject stock;

(3) the dividend growth rate of the held stock;

(4) the total before-tax-return potential from either a specific stock or an otherwise active re-investment discipline option, assuming the various alternate re-investment options all calculate dividend rates equal to a current rate of the S&P500;

(5) the turnover assumption anticipated with any re-investment strategy;

(6) a five-year growth rate assumption for the Standard & Poor's 500 (S&P500), where a passive strategy comparison is desired;

(7) a five-year price-earnings forecast for the S&P500; and

(8) an assumption as to how vulnerable to an immediate loss a specific lot might be subject to.

The computerized system 100 and method then compares the after-tax proceeds of several investment strategies to identify which is optimal from an after-tax perspective 208. The computerized system 100 and method may evaluate the following example strategies FIG. 6:

(1) purchasing a lot of a security at the currently inputted price and holding for the selected holding period;

(2) holding an existing lot position until the termination of an investment horizon;

(3) selling the lot at currently inputted prices and re-investing in another lot or otherwise in an active investment discipline for a specified investment horizon;

(4) selling the lot at currently inputted prices and re-investing in a secondary or S&P500-based passive discipline for a specified investment horizon;

(5) selling the lot at the beginning of the long-term window and re-investing in a primary or active investment discipline, for the number of months remaining after an anticipated sell, for a specified investment horizon; or

(6) selling the lot at the beginning of the long-term window and re-investing in an S&P500-based passive discipline for the number of months remaining after an anticipated sell, for a specified investment horizon.

ADDITIONAL EMBODIMENTS

The system 100 described herein with regard to FIGS. 1-8 may be incorporated into and/or in communication with other systems capable of performing the optimizing of after-tax proceeds involving other financial instruments, including options, taxable lots, derivatives, as well as bonds and the like. In one alternative embodiment shown in FIGS. 9-43, a system 1000 and associated methods, which may include a spreadsheet program or other hardware and/or software implementations, may be used to determine and optimize after-tax proceeds involving options and comparable financial instruments, as well as stocks and bonds.

FIGS. 13-43 illustrate an example spreadsheet with example values and formulas of the alternative embodiment using financial information input and/or stored in the memory 106 of the system 1000 shown in FIG. 9. Such financial information may include the data records or tables 122-126 described herein with respect to FIG. 1, and may also include an options database 1002, which may include a listing of various options-related instruments such as lots and/or taxable entities. The spreadsheet in FIGS. 13-43 may be implemented as the spreadsheet program 1004 for the disclosed invention executed by the processor 104 as described herein with reference to the spreadsheet program 116 in FIGS. 1 and 3A-7B. For example, the spreadsheet in FIGS. 13-43 may be an extension of the spreadsheet in

FIGS. 3A-7B, and/or each set of cells in FIGS. 3A-7B and 13-43 may be subsets of an overall spreadsheet program accessible by a user.

Alternatively and/or additionally, as shown in FIG. 9, the disclosed invention may be implemented as an application program 1006 and/or a computation server 1008 as described herein with reference to the program 118 and server 120 of FIG. 1. The disclosed system 1000 implementing optimization in view of options also includes appropriate interfaces 102 with components 108-114 shown in FIG. 10, as described herein with reference to the components 108-114 in FIG. 1.

Referring to FIG. 10, the system 1000 of FIG. 9 operates according to the flowchart 2000 in a similar manner to the operation of the system 100 in FIG. 1 with reference to FIG. 2, but with appropriate options information and information processing. In FIG. 10, facts and expectations are input to a price targeting module 2002 which provides and/or generates expectations 2004, such as holds, dividends and/or interest, re-investment assumptions, etc., with interest expectations pertinent to optimization involving bonds. Available facts, equity, and/or bond lot information 2006, including options data, as well as costs, prices, tax rates, choices of options versions, realized gains and losses, bond data, other equity data, and/or currency data.

Such available facts, equity, and/or bond lot information 2006 are also provided, for example, as inputs to an options expiration monitor module 2008, and optionally to a tax loss harvesting analyzer shown in FIG. 2 for optimizations involving stocks and/or bonds. The options expiration monitor module 2008 tracks available options and their expirations, and generates expiration messages or warnings. In addition, the available facts and lot information 2006 may include choices of option versions and strategies, such as straight equity, employee stock, employee incentive, etc., any or all of which the user may select through the interface 102 to control the operation of the processor 104 to perform the after-tax

optimization involving options. In additional and/or alternative embodiments, the facts and lot information 2006 may include bond data.

The expectations 2004, the facts and lot information 2006, and the expiration messages from the options expiration monitor module 2008 are applied to a comparative pro-forma sensitivity analyzer 2010 for generating an optimal strategy path recommendation 2012, which includes and considers options in the strategy path for optimal after-tax proceeds from various investment paths including options. In the additional and/or alternative embodiments, the bond data may be inputted to the comparative pro-forma sensitivity analyzer 2010 for determining an optional strategy path recommendation 2012 involving bonds.

In use, the system 1000 described herein with reference to FIGS. 9-43 implements the "DYNAMIC TAX LOGIC" , "DYNAMIC TAX OPTIMIZATION", and/or "DYNAMIC TAX OPTIMIZER, products and services commercially available from "DYNAMIC CAPITAL MANAGEMENT", to perform a rational sell discipline, and represents a mathematical approach to determining when an equity security, on a lot-by-lot basis, representing a taxable entity, should be sold, taxes paid, and reinvested for higher after-tax wealth generation, based upon a set of investment facts and expectations. In this manner, the system 1000 considers capital appreciation, dividends received, dividend taxes paid at marginal rates, the maturity of a purchase for the determination of the application of a higher tax rate to a lower tax rate on any realized appreciation, the cost of a purchase, the resulting profit, and any resulting after-tax direct proceeds. This results because the overall method is an attempt to compare the relative future dollar money values available to an investor should an investor decide to sell an asset today, or wait until sometime in the future. To be thorough, the system 1000 may operate to include the expenses associated with investment activities such as brokerage and investment advisory fees, because

such expenses represent real costs that ultimately determine spendable after-tax proceeds net of all direct associated costs.

As described herein for the system 100 referred to in FIGS. 1-8, the system 1000 operates to apply to adjustments in tax law to the derivatives of individual lots and/or otherwise taxable entities. For example, in the case of options in generalizing DTL optimization methods, the optimization questions for different investment strategies are:

1. whether an option to purchase a share, or shares, of stock should be exercised now, and

1a. hold the position until the end of an investment horizon, such as twelve months past a maturity date, or

1b. sold immediately with the resulting after-tax proceeds re-invested until the end of the investment horizon such as twelve months past maturity, or

1c. sold at the point where long term capital gains treatment is achieved such as twelve months, and re-invest until the end of the investment horizon, in the case of a straight options version,

2. wait to the maturity date until the option would otherwise expire to exercise and purchase, and

2a. choose to sell immediately, re-investing the after-tax proceeds until the end of the investment horizon, or

2b. wait until the end of the investment horizon to sell, being twelve months past the maturity of the option when the long term capital gains rate is achieved in the case of the straight options version.

Accordingly, in the illustrative embodiment of the disclosed system 1000, the following five different strategies implementing investment choices may be

used, compared, and contrasted, such as shown in FIG. 12, to obtain the optimal performance:

1. exercise now and sell 12 months past maturity;

2. exercise now and sell now, and re-invest until 12 months past maturity;

3. exercise now and sell at the long term window in 12 months, and re-investing until 12 months past maturity, being the end of the common investment horizon (in the straight option version);

4. exercise at maturity and sell immediately, re-investing until 12 months expires, or whenever the long term window is achieved; and

5. exercise at maturity and hold until the long term window is achieved.

It is to be understood that, in the illustrative embodiment described herein, a twelve month holding period reflecting a long-term window may be used, for example, in a straight options version of the disclosed system 1000. However, the holding period may be varied for different embodiments of the system 1000, for example, using a twenty-four month window and/or windows of different duration in other embodiments to exercise options now, and hold the position until the end of an investment horizon, which is twelve months past the maturity date, or twenty four months after the options begin to mature.

Each choice represents a decision point alternative determined both by specific tax parameters such as capital gains treatments, horizons relative to time, investment facts, and performance expectations. In this example version of derivatives, a minimum five sets of decision points would have to have resulting future after-tax dollar values projected for optimization comparison purposes, as opposed to only three necessary in the primary equities market. The material sell decision points become either: selling now, sell in twelve months, sell at the

expiration of the stock option, or sell twelve months after the expiration of the stock option, with a purchase decision a function of the optimal selling strategy.

For the method to be accurately executed in this set of vehicles, the pro-formas performed by the analyzer 2010 of FIG. 10, for example, would be reflective of the fact that no dividends would be received while the option was not exercised. The investment time horizons available to the user would allow them to pick the number of months or quarters away from the expiration of the option, representing a reference point for the end of an investment horizon in something shorter than annual increments. The end of horizon and the final decision point would be the point of long term capital gains treatment, such as twelve months after the expiration of the option.

In specific terms, there would be a separate set of calculations utilizing the disclosed methodology and/or whatever procedures may be consistent with a predetermined set of tax code regulations, subject to a specific investment, if the options under consideration are employee stock options, and either qualified or not. The various methodologies and procedures may be employed to assess the effects of one or more investment strategies and paths, such as described above as the strategies 1a-1b and 2a-2b.

These characteristics, as currently defined by law, would determine capital gains or marginal tax treatment. In any event, each set of applicable laws would determine the pro-forma math set performed by the analyzer 2010 of FIG. 10 which are necessary to accomplish the method by which end of horizon comparative after-tax dollar values may be simulated or projected in order to determine the optimal strategy path 2012, including options, in FIG. 10.

In other embodiments of the system 1000 incorporating considerations of options and maturity thereof, a predetermined horizon may be set at, for example, two years for option maturity for determining the optimal strategy path

recommendation. As shown in FIG. 11, over the predetermined horizon of two years, the system 1000 compares the full market value of an exercised lot relative to an exercise cost of an optioned lot. FIG. 11 indicates that a first and relatively simple strategy path 2014 of holding onto the optioned lot until maturity to a value of, for example, $ 13,782 is optimal compared to the exercise cost 2016 of the optioned lot valued at, for example, $ 7,000. Using the pro-forma analyzer 2010, the system 1000 chooses between the paths 2014, 2016 and outputs the optimal path recommendation 2012 to the user, via the interface 102, as an outputted optimal after-tax investment strategy path advises a user of optimal investments to be made, such that the optimal strategy path recommendation 2012 in FIG. 10 takes into account such increases in full market value.

FIG. 12 illustrates a chart depicting results of the computerized system and method for optimizing after-tax proceeds involving options compared with multiple alternate investment strategies that are known in the art. The various strategies involving options include a first strategy 2018 in which one exercises a purchase at maturity, and sells long term; a second strategy 2020 in which one exercises a purchase at maturity, and sells immediately and re-invests; a third strategy 2022 in which one exercises a purchase now, not at maturity, and sells long term and re-invests; a fourth strategy 2024 in which one exercises a purchase now and sells twelve months past maturity of the option; and a fifth strategy 2026 in which one exercises a purchase now, and sells now and re-invests.

In an example embodiment of the system 1000 as a spreadsheet shown in FIGS. 13-43, a user may jump to cell AA1 in FIG. 13 using, for example, a GOTO or F5 command in "LOTUS", to view the list of strategies in cells AA3-AE17. The user may then use the client input customization window for inputting custom assumptions as facts and lot information 2006 in cells AA20-AE50 shown in FIGS. 13-14. Expectations 2004 are also input through the price targeting module 2002

such as cells AA35-AF53 in FIGS. 13-14 to be stored as expectations 2004, shown in FIG. 10.

The system 1000 then performs the optimization by a comparative pro-forma sensitivity analyzer 2010, embodied as the spreadsheet cells and associated formulae shown in FIGS. 14- 43 having at least cells AA70-AJ2170, and displays the optimization results for each of the five strategies and for each of the quarters until an option matures, depending on the number of quarters until the option expires. It is to be understood that the spreadsheet shown may include additional cells and associated formulae not shown in FIGS. 13-43 which are interconnected and linked to the cells and associated formulae shown in FIGS. 13-43.

For example, as shown in FIG. 13, for the sample financial data over eight quarters until option maturity and over forty quarters until the option expires, the optimization results are generated by the system 1000 according to each of the strategies, with the optimization results output in cells AA55-AE67, as shown in FIG. 14.

The pro-forma analyzer 2010 shown in FIGS. 14-43 includes sets of cells respectively dedicated to performing the pro-forma calculations based on a respective strategy. For example, the cells shown in rows 70-485 in FIGS. 14-20, illustrate the calculations for the strategy of exercising a purchase at maturity and then selling immediately, with calculations for each quarter until option maturity, in this example, being eight quarters, extending in cells to the right of the spreadsheet and for each quarter until the option expires, in this example, being forty quarters, extending for each quarter in cells downward, such as cells AA117-AF132 shown in FIG. 16 for calculating the value ending in the fourth quarter.

For a second strategy of exercising purchases at maturity and selling long term, the pro-formas are shown in rows 490-905 in FIGS. 20-26. For a third strategy of exercising a purchase now and selling now, the pro-formas are shown in rows

910-1325 in FIGS. 26-32. For a fourth strategy of exceeding a purchase now and selling long term, the pro-formas are shown in rows 1330-1750 in FIGS. 32-38. For a fifth strategy of exercising a purchase now and selling twelve months past maturing, the pro-formas are shown in rows 1754-2170 in FIGS. 38-43.

The results of the pro-formas are then displayed as the optimization results in FIG. 14, which may also be plotted by the spreadsheet, for example, as the strategy paths 2018-2026 as shown in FIG. 12, to be output to a user to assist in visualizing the optimal investment strategy path to use. It is to be understood that multiple strategies, including different types and numbers of strategies, may be implemented by the system 1000, and so are not limited to the five strategies described wherein and such strategies descried herein are not exhaustive.

By the foregoing the computerized systems 100, 1000 and method have been disclosed by way of the preferred embodiment. However, numerous modifications and substitutions may be had without departing from the spirit of the invention. For example, while the preferred embodiment discusses using a computer implementing formulae in a spreadsheet, it is wholly within the purview of the invention to contemplate a database program implementing such formula and displaying such input and output windows in the manner as set forth above. In addition, other financial instruments such as bonds may also be considered in determining an optimal strategy investment path for a user.

For example, the systems and methods described herein may be used to determined when a zero-coupon bond is to be sold, with the taxes being paid, and re-invested for higher after-tax wealth using, for example, a micro-pro forma analysis. As shown in FIG. 10, various financial investments, such as stocks, options, bonds, etc., including combinations thereof, may be evaluated using the disclosed systems and methods and extensions thereof to apply associated mathematical calculations and methodologies applicable to associated economics and tax rules involving such

financial instruments, to determine the optimized investment strategies for individuals, institutions, and combinations thereof.

In one example, embodiment, the optimization of after-tax proceeds involving investments including bonds may include the tax loss harvesting analyzer 210 described wherein and shown in FIG. 2. Alternatively, the components and operations of both systems 100, 1000 may be combined and/or extended to facilitate and display investments strategy paths which optimize after-tax proceeds involving any combination of financial instruments, including stocks, bonds, options, derivatives, mutual funds, Treasuries, international currency markets, American Depositary Receipts (ADRs), "BOWIE" bonds based on celebrity royalties, etc. Accordingly, the invention has been described by way of illustration rather than limitation.

APPENDIX A

	AL	AM
490		3YR
491		=(AP608)
492	=(AN573)	=SUM(AM493:AM496)
493	=(AN574)	=IF(AL512=AL508,$AL523,0)
493	=(AN575)	=IF(AL508=AL512,$AL531,0)
495	=(AN569)	=IF(AL508=AL512,+$AM531,0)
496	=(AN570)	=IF(AL508=AL512,$AM523,0)
497	=(AN568)	
498	=(AN571)	=(AL527+AM527+AL535+AM535)
499	=(AL497+AL498)	
500	=(AN572)	
501	=(AL500*AL495)	
502	=IF(AL498<0,AL498,0)	
503	=(AL493+AL538)	
504	=IF(AL494<1,AL496,AL495)	
505	3YR	4YR
506	=(AO616)	=(AP616)
507	=(AO617)	=(AP617)
508	=(AO618)	=(AP618)
509	=(AO619)	=(AP619)
510	=(AO620)	=(AP620)
511	=(AO621)	=(AP621)
512	=MAX(AL507:AL510)	=MAX(AM507:AM510)
513		
514	=(AL503/AL492)	EFFECTIVE RATE
515	=(AL492*AN557)	=IF(AN516>1,1,AN516)
516	=(AN557-AL537)/AL537	TURNOVER
517	=IF(AL494>0,((AL515-(AL495*(AL515-AL493)))),(AL515-(AL496*(AL515-AL493))))	LONG TERM AFTER TAX VAL
518	=IF((AN557-(AL493/AL492))<0,0,(AN557-(AL493/AL492)))	
519		

APPENDIX A - Continued

	AL	AM
520	1. ST/ST	4. LT/ST NET
521	=IF(AL497<0,AL497,0)	=IF(AL497+AL498+AL500+AM531*AL518<0,AL498+AL497+AM531*AL518+AL500,0)
522	=IF(AL494>0,(AL492*AN557)-AL493,0)	=IF(AL494<0.001,((AL492*AN557)-AL493)-AL518*AM531,0)
523	=IF(AL518=0,0,MIN(-AL521/$AL518,AL522/AL518))	=IF(AL518=0,0,MIN(-AM521/AL518,AM522/AL518))
524	=(AL497+(AL523*AL518))	=(AL497)+AL518*AM523
525	=AL498	=(AL498+((AM531)*AL518))
526	=(AL497+AL498+(AL523*AL518))	=(AL497+AL498+(AM531+AM523)*AL518)
527	=IF(AND(AL526>0,AL524>AL525),AL495*AL526,IF(AND(AL526>0,AL525>AL524),AL496*AL526,0))	=IF(AND(AM526>0,AM524>AM525),AL495*AM526,IF(AND(AM526>0,AM525>AM524),AL496*AM526,0))
528	2. ST/LT	3. LT/LT
529	=IF(AL498<0,AL499+AL523*AL518,0)	=IF(AL498<0,AL498,0)
530	=IF(AL494>0,((AL492*AN557)-AL493)-AL523*AL518,0)	=IF(AL494<0.001,(AL492*AN557)-AL493,0)
531	=IF(AL518=0,0,MIN(-AL529/AL518,AL530/AL518))	=IF(AL518=0,0,MIN(-AM529/AL518,AM530/AL518))
532	=(AL497+AL518*(AL523+AL531))	=AL497
533	=AL498+AL518*AL531	=(AL498+(AM531*AL518))
534	=(AL497+AL498+(AL531*AL518)+(AL518*AL523))	=(AL497+AL498+(AM531*AL518))
535	=IF(AND(AL534>0,AL532>AL533),AL495*AL534,IF(AND(AL534>0,AL533>AL532),AL496*AL534,0))	=IF(AND(AM534>0,AM532>AM533),AL495*AM534,IF(AND(AM534>0,AM533>AM532),AL496*AM534,0))
536		
537	=(AL493/AL492)	
538	=(AL523+AM523+AL531+AM531)*AL518	

APPENDIX A - Continued

	AN	AO
490	4YR	5YR
491	=(AP610)	=(AP612)
492	=SUM(AN493:AN496)	=SUM(AO493:AO496)
493	=IF(AM512=AM508,$AL523,0)	=IF(AN512=AN508,$AL523,0)
493	=IF(AM508=AM512,$AL531,0)	=IF(AN508=AN512,$AL531,0)
495	=IF(AM508=AM512,+$AM531,0)	=IF(AN508=AN512,+$AM531,0)
496	=IF(AM508=AM512,$AM523,0)	=IF(AN508=AN512,$AM523,0)
497		
498	CUR YR TAXES	
499		
500		
501		
502		
503		
504		
505	5YR	
506	=(AQ616)	
507	=(AQ617)	
508	=(AQ618)	
509	=(AQ619)	
510	=(AQ620)	
511	=(AQ621)	
512	=MAX(AN507:AN510)	
513		
514	=(AN515*AL496+(1-AN515)*AL495)	
515	=IF(AM515<0.501,1,(1-((AM515-0.5)/0.5)))	
516	=(AN562)	
517	=(C701)	

APPENDIX A - Continued

	AO	AP	AQ
608		=(CP57)	
609			
610		=(CP58)	
611			
612		=(CP59)	
613			
614	3YR	4YR	5YR
615			
616	=(CP60)	=(CP61)	=(CP62)
617	=(CP63)	=(CP64)	=(CP65)
618	=(CP66)	=(CP67)	=(CP68)
619	=(CP69)	=(CP70)	=(CP71)
620	=(CP72)	=(CP73)	=(CP74)
621	=(CP75)	=(CP76)	=(CP77)
622			
623			
624			
625	=(CP78)	=(CP79)	=(CP80)
626			
627			
628		=(AP606)	
629			
630		=(CP123)	
631			
632		=(CP124)	
633			
634		=(CP125)	
635			
636	3YR	4YR	5YR
637			
638	=(CP126)	=(CP127)	=(CP128)
639	=(CP129)	=(CP130)	=(CP131)
640	=(CP132)	=(CP133)	=(CP134)
641	=(CP135)	=(CP136)	=(CP137)
642	=(CP138)	=(CP139)	=(CP140)
643	=(CP141)	=(CP142)	=(CP143)
647	=(CP144)	=(CP145)	=(CP146)

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APPENDIX A - Continued

	AL	AM
676	=($AN$582+$AN$583)	=($AN$582+$AN$583)
677	=(AL679+AL678)	=(AM679+AM678)
678	=($CP$55)	=($CP$55)
679	=(AL747)	=(AM747)
680	=(AL683)	=($AN$576)
681		
682		
683	=($AN$573*$B$2)	=($AN$573*$B$2)
684	=(AL683)	=(AM683-(AM683-AM680)*$CP$56)
685		
686	=(AL684*AL679)	=(AM683*AM679)
687	0	0
688	=(AL684*AL678)	=(AM683*AM678)
689	0	0
690	=(AL688*$AN$569)	=(AM688*$AN$569)
691	=(AL683*AL676)	=(AM683*AM676)
692	=($AN$584*$AN$573)	0
693	=(AL683+AL686+AL688-AL689-AL690-AL691-AL692)	=(AM683+AM686+AM688-AM689-AM690-AM691-AM692)
694	=(AL693*AL679)	=(AM693*AM679)
695	0	0
696	=(1+$F$18)*AL688	=(1+$F$18)*AM688
697	0	0
698	=(AL696*$AN$569)	=(AM696*$AN$569)
699	=(AL693*AL676)	=(AM693*AM676)
700	0	0
701	=(AL693+AL694+AL696-AL697-AL698-AL699-AL700)	=(AM693+AM694+AM696-AM697-AM698-AM699-AM700)
702	=(AL701*AL679)	=(AM701*AM679)
703	0	0
704	=(1+$F$18)*AL696	=(1+$F$18)*AM696
705	0	0
706	=(AL704*$AN$569)	=(AM704*$AN$569)
707	=(AL701*AL676)	=(AM701*AM676)

APPENDIX A - Continued

	AL	AM
708	0	0
709	=(AL701+AL702+AL704-AL705-AL706-AL707-AL708)	=(AM701+AM702+AM704-AM705-AM706-AM707-AM708)
710	=(AL709*AL679)	=(AM709*AM679)
711	0	0
712	=(1+$F$18)*AL704	=(1+$F$18)*AM704
713	0	0
714	=(AL712*$AN$569)	=(AM712*$AN$569)
715	=(AL709*AL676)	=(AM709*AM676)
716	0	0
717	=(AL709+AL710+AL712-AL713-AL714-AL715-AL716)	=(AM709+AM710+AM712-AM713-AM714-AM715-AM716)
718	=(AL717*AL$679)	=(AM717*AM679)
719	=(AL$728*$AN$573)-AL$683-AL$692	=(AM728*$AN$573)-AM680-($AN$573*$AN$584)
720	=(1+$F$18)*AL712	=(1+$F$18)*AM712
721	=(AL719*$AN$570)	=(AM719*$AN$570)
722	=(AL720*$AN$569)	=(AM720*$AN$569)
723	=(AL717*AL$676)	=(AM717*AM676)
724	=(AL$692)	=($AN$584*$AN$573)
725	=(AL717+AL718+AL720-AL721-AL722-AL723-AL724)	=(AM717+AM718+AM720-AM721-AM722-AM723-AM724)

APPENDIX A - Continued

	AO	AP
676	=($AN$582+$AN$583)	=($AN$582+$AN$583)
677	=(AO679+AO678)	=(AP679+AP678)
678	=($AN$595)	=($AN$595)
679	=($AN$577-AO678)	=(AR857)
680	=($AN$576)	=($AN$576)
681		
682		
683	=($AN$573*$B$2)	=($AN$573*$B$2)
684	=(AO683-(AO683-AO680)*$CP$56)	=(AP683-(AP683-AP680)*$CP$56)
685		
686	=(AO684*AO679)	=(AP684*AP679)
687	=IF($AN$562>0.999,AO686,$AN$562*AO686)	0
688	=(AO684*AO678)	=(AP684*AP678)
689	=($AN$569*AO687)	0
690	=(AO688*$AN$569)	=(AP688*$AN$569)
691	=(AO684*AO676)	=(AP684*AP676)
692	=($AN$562*2*$AN$584*$AN$573)	0
693	=(AO684+AO686+AO688-AO689-AO690-AO691-AO692)	=(AP684+AP686+AP688-AP689-AP690-AP691-AP692)
694	=(AO693*AO679)	=(AP693*AP679)
695	=IF($AN$562>0.999,AO694,$AN$562*(AO694+AO686-AO687))	0
696	=(AO693*AO$678)	=(AP678)*AP693
697	=($CP$54*AO695)	0
698	=(AO696*$AN$569)	=(AP696*$AN$569)
699	=(AO693*AO676)	=(AP693*AP676)
700	=($AN$562*2*$AN$584*$AN$573)	0
701	=(AO693+AO694+AO696-AO697-AO698-AO699-AO700)	=(AP693+AP694+AP696-AP697-AP698-AP699-AP700)
702	=(AO701*AO679)	=(AP701*AP679)
703	=IF($AN$562>0.999,AO702,$AN$562*(AO702+AO694-AO695+AO686-AO687))	0
704	=(AO701*AO$678)	=(AP701*AP$678)
705	=($CP$54*AO703)	0
706	=(AO704*$AN$569)	=(AP704*$AN$569)
707	=(AO701*AO676)	=(AP701*AP676)

APPENDIX A - Continued

	AO	AP
708	=($AN$562*2*$AN$584*$AN$573)	0
709	=(AO701+AO702+AO704-AO705-AO706-AO707-AO708)	=(AP701+AP702+AP704-AP705-AP706-AP707-AP708)
710	=(AO709*AO679)	=(AP709*AP679)
711	=IF($AN$562>0.999,AO710,$AN$562*(AO710+AO694-AO695+AO686-AO687+AO702-AO703))	0
712	=(AO709*AO$678)	=(AP709*AP$678)
713	=($CP$54*AO711)	0
714	=(AO712*$AN$569)	=(AP712*$AN$569)
715	=(AO709*AO676)	=(AP709*AP676)
716	=($AN$562*2*$AN$584*$AN$573)	=($AN$562*2*$AN$584*$AN$573)
717	=(AO709+AO710+AO712-AO713-AO714-AO715-AO716)	=(AP709+AP710+AP712-AP713-AP714-AP715-AP716)
718	=(AO717*AO679)	=(AP717*AP679)
719	=IF($AN$562>0.999,AO718,AO718+AO694-AO695+AO686-AO687+AO702-AO703+AO710-AO711)	=(AP686+AP694+AP702+AP710+AP718)
720	=(AO717*AO$678)	=(AP717*AP$678)
721	=($CP$54*AO719)	=(AP719)*AN$570
722	=(AO720*$AN$569)	=(AP720*$AN$569)
723	=(AO717*AO676)	=(AP717*AP676)
724	=($AN$562*2*$AN$584*$AN$573)	=($AN$562*2*$AN$584*$AN$573)
725	=(AO717+AO718+AO720-AO721-AO722-AO723-AO724)	=(AP717+AP718+AP720-AP721-AP722-AP723-AP724)

APPENDIX A - Continued

	AQ	AR
676	=($AN$582+$AN$583)	=($AN$582+$AN$583)
677	=(AQ679+AQ678)	=(AR679+AR678)
678	=(AO678)	=(AP678)
679	=($AN$577-AQ678)	=(AR857)
680	=($AN$576)	=($AN$576)
681		
682		
683	=($AN$573*$B$2)	=($AN$573*$B$2)
684	=(AQ683-(AQ683-AQ680)*$CP$56)	=(AR683-(AR683-AR680)*$CP$56)
685		
686	=(C695+C696)	=(I695+I696)
687	=(C698+C699)	=(I698)
688	=($C$693/12)*$CP$55*AQ683+((12-$C$693)/12)*$AN$595*($C694-(C698*AN570))	=(AQ688)
689	=($AN$570*C698)+(CP54*C699)	=($AN$570*AR687)
690	=(AQ688*$AN$569)	=(AR688*$AN$569)
691	=(AQ683*AQ676)	=(AR683*AR676)
692	=($AN$573*2*$AN$584)	0
693	=(AQ683+AQ686+AQ688-AQ689-AQ690-AQ691-AQ692)	=(AR683+AR686+AR688-AR689-AR690-AR691-AR692)
694	=(AQ693*AQ679)	=(AR693*AR679)
695	=IF($AN$562>0.999,AQ694,$AN$562*(AQ694+C696-C699))	0
696	=(AQ678)*AQ693	=(AR678)*AR693
697	=($CP$54*AQ695)	0
698	=(AQ696*$AN$569)	=(AR696*$AN$569)
699	=(AQ693*AQ676)	=(AR693*AR676)
700	=($AN$562*2*$AN$584*$AN$573)	0
701	=(AQ693+AQ694+AQ696-AQ697-AQ698-AQ699-AQ700)	=(AR693+AR694+AR696-AR697-AR698-AR699-AR700)
702	=(AQ701*AQ679)	=(AR701*AR679)
703	=IF($AN$562>0.999,AQ702,$AN$562*(AQ702+AQ694+C696-AQ695-C699))	0
704	=(AQ701*AQ$678)	=(AR701*AR$678)
705	=($CP$54*AQ703)	0
706	=(AQ704*$AN$569)	=(AR704*$AN$569)
707	=(AQ701*AQ676)	=(AR701*AR676)

APPENDIX A - Continued

	AQ	AR
708	=($AN$562*2*$AN$584*$AN$573)	0
709	=(AQ701+AQ702+AQ704-AQ705-AQ706-AQ707-AQ708)	=(AR701+AR702+AR704-AR705-AR706-AR707-AR708)
710	=(AQ709*AQ679)	=(AR709*AR679)
711	=IF($AN$562>0.999,AQ710,$AN$562*(AQ710+AQ702+AQ694+C696-AQ703-AQ695-C699))	0
712	=(AQ709*AQ$678)	=(AR709*AR$678)
713	=($CP$54*AQ711)	0
714	=(AQ712*$AN$569)	=(AR712*$AN$569)
715	=(AQ709*AQ676)	=(AR709*AR676)
716	=($AN$562*2*$AN$584*$AN$573)	0
717	=(AQ709+AQ710+AQ712-AQ713-AQ714-AQ715-AQ716)	=(AR709+AR710+AR712-AR713-AR714-AR715-AR716)
718	=(AQ717*AQ679)	=(AR717*AR679)
719	=IF($AN$562>0.999,AQ718,(AQ718+AQ710+AQ702+AQ694+C696-AQ711-AQ703-AQ695-C699))	=(AR686+AR694+AR702+AR710+AR718)
720	=(AQ717*AQ$678)	=(AR717*AR$678)
721	=($CP$54*AQ719)	=(AR719)*AN$570
722	=(AQ720*$AN$569)	=(AR720*$AN$569)
723	=(AQ717*AQ676)	=(AR717*AR676)
724	=($AN$562*2*$AN$584*$AN$573)	0
725	=(AQ717+AQ718+AQ720-AQ721-AQ722-AQ723-AQ724)	=(AR717+AR718+AR720-AR721-AR722-AR723-AR724)